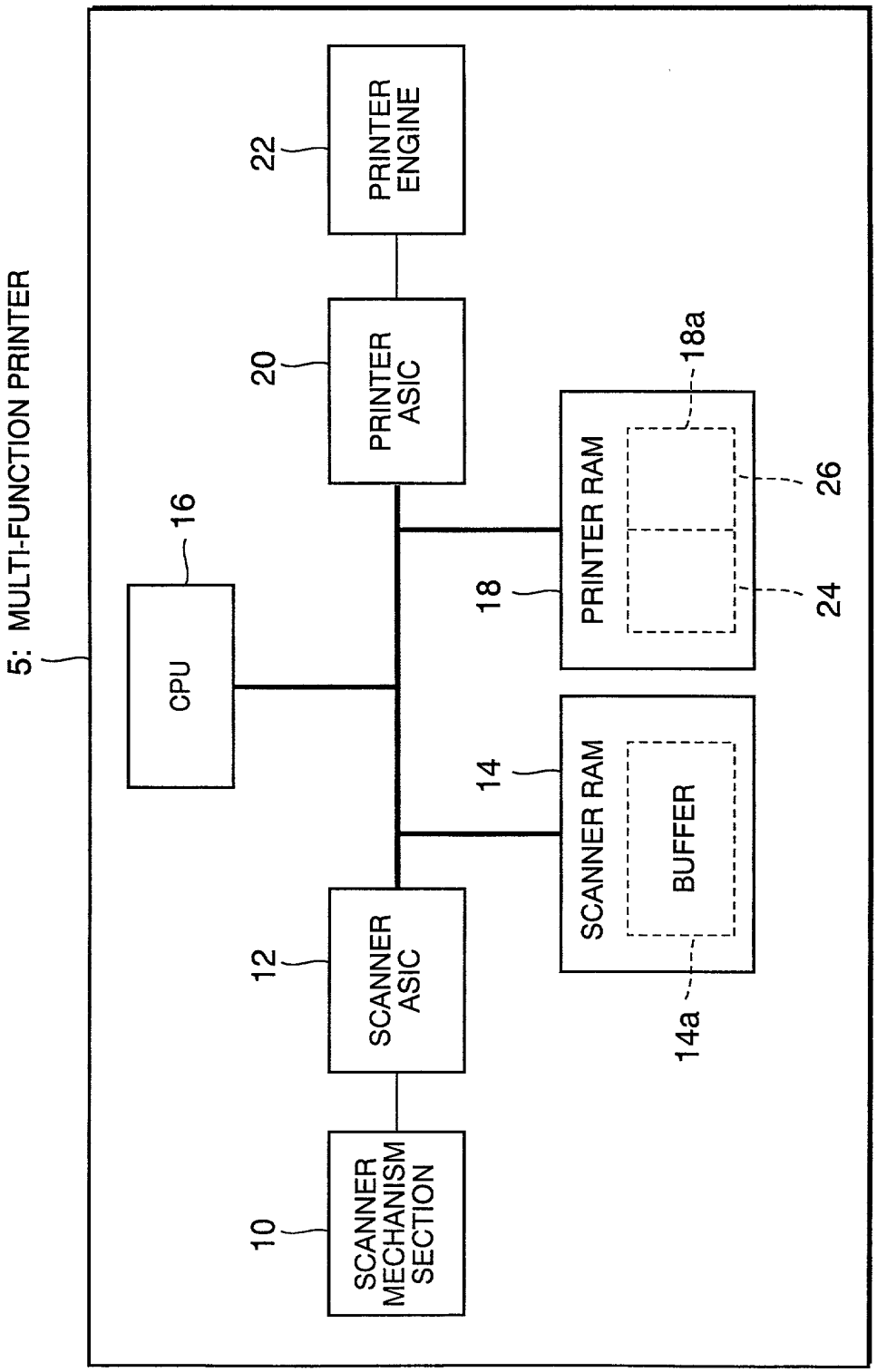
5: MULTI-FUNCTION PRINTER
CPU
16
PRINTER ENGINE
22
PRINTER ASIC
20
PRINTER RAM
18
18a
26
24
SCANNER RAM
14
BUFFER
14a
SCANNER ASIC
12
SCANNER MECHANISM SECTION
10

FIG. 1

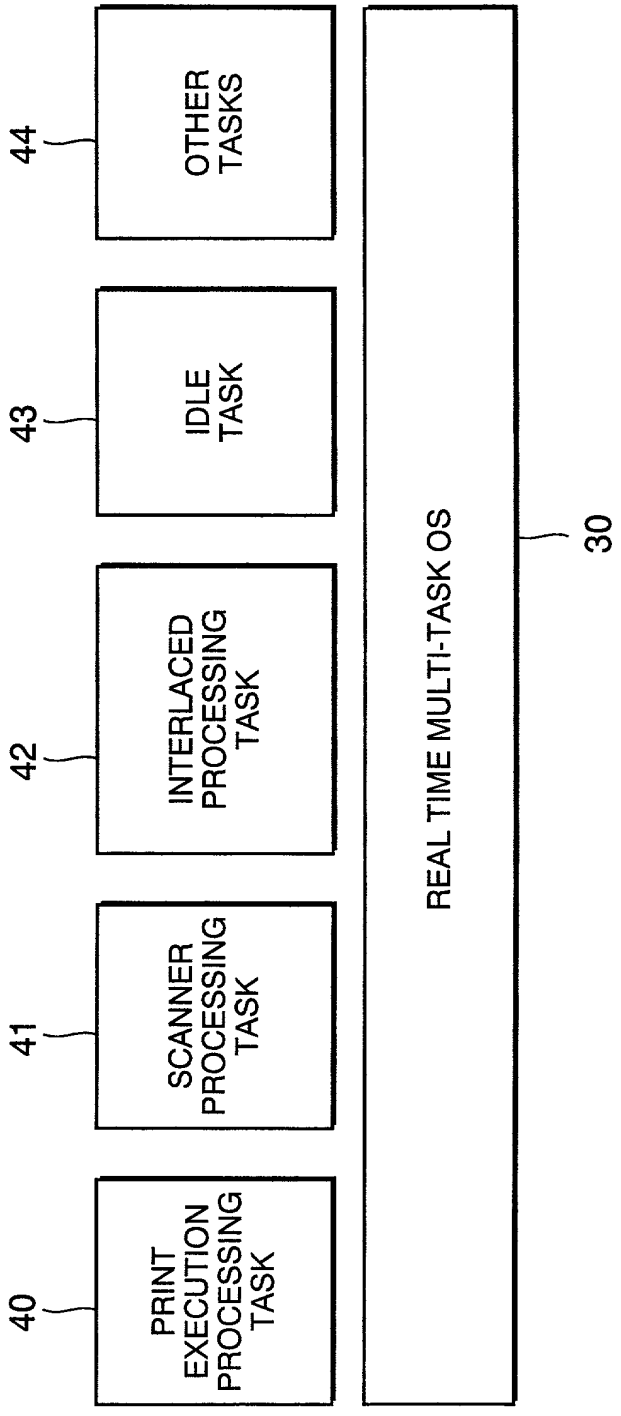
40
PRINT EXECUTION PROCESSING TASK
41
SCANNER PROCESSING TASK
42
INTERLACED PROCESSING TASK
43
IDLE TASK
44
OTHER TASKS
REAL TIME MULTI-TASK OS
30

FIG. 2

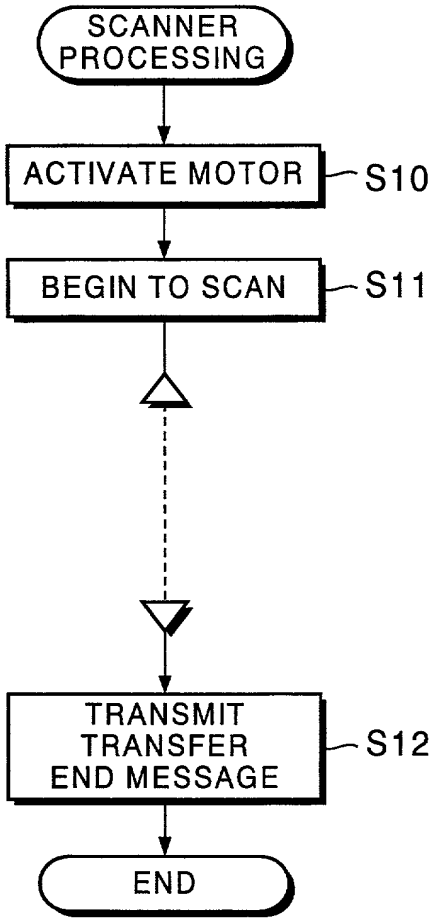
SCANNER PROCESSING
ACTIVATE MOTOR
S10
BEGIN TO SCAN
S11
TRANSMIT TRANSFER END MESSAGE
S12
END

FIG. 3

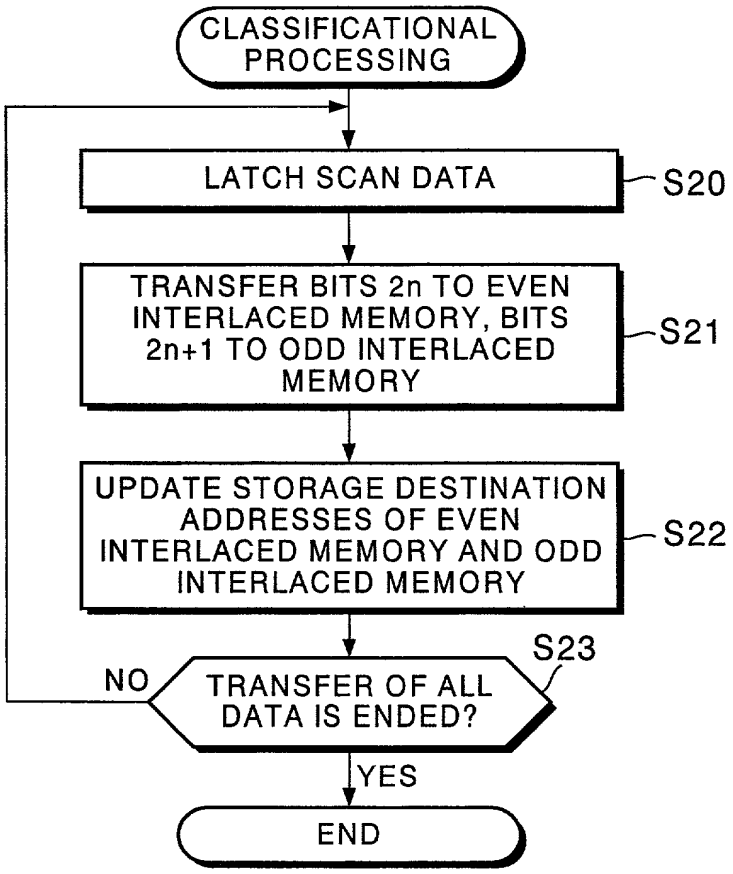
CLASSIFICATIONAL PROCESSING
LATCH SCAN DATA
S20
TRANSFER BITS 2n TO EVEN INTERLACED MEMORY, BITS 2n+1 TO ODD INTERLACED MEMORY
S21
UPDATE STORAGE DESTINATION ADDRESSES OF EVEN INTERLACED MEMORY AND ODD INTERLACED MEMORY
S22
S23
NO
TRANSFER OF ALL DATA IS ENDED?
YES
END

FIG. 4

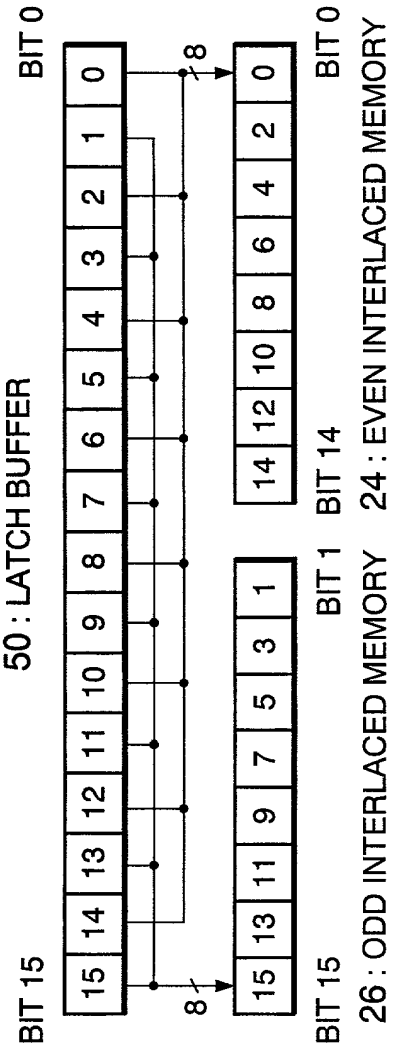
BIT 15
50 : LATCH BUFFER
BIT 0
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
8
8
15 13 11 9 7 5 3 1
14 12 10 8 6 4 2 0
BIT 15
BIT 1
BIT 14
BIT 0
26 : ODD INTERLACED MEMORY
24 : EVEN INTERLACED MEMORY

FIG. 5

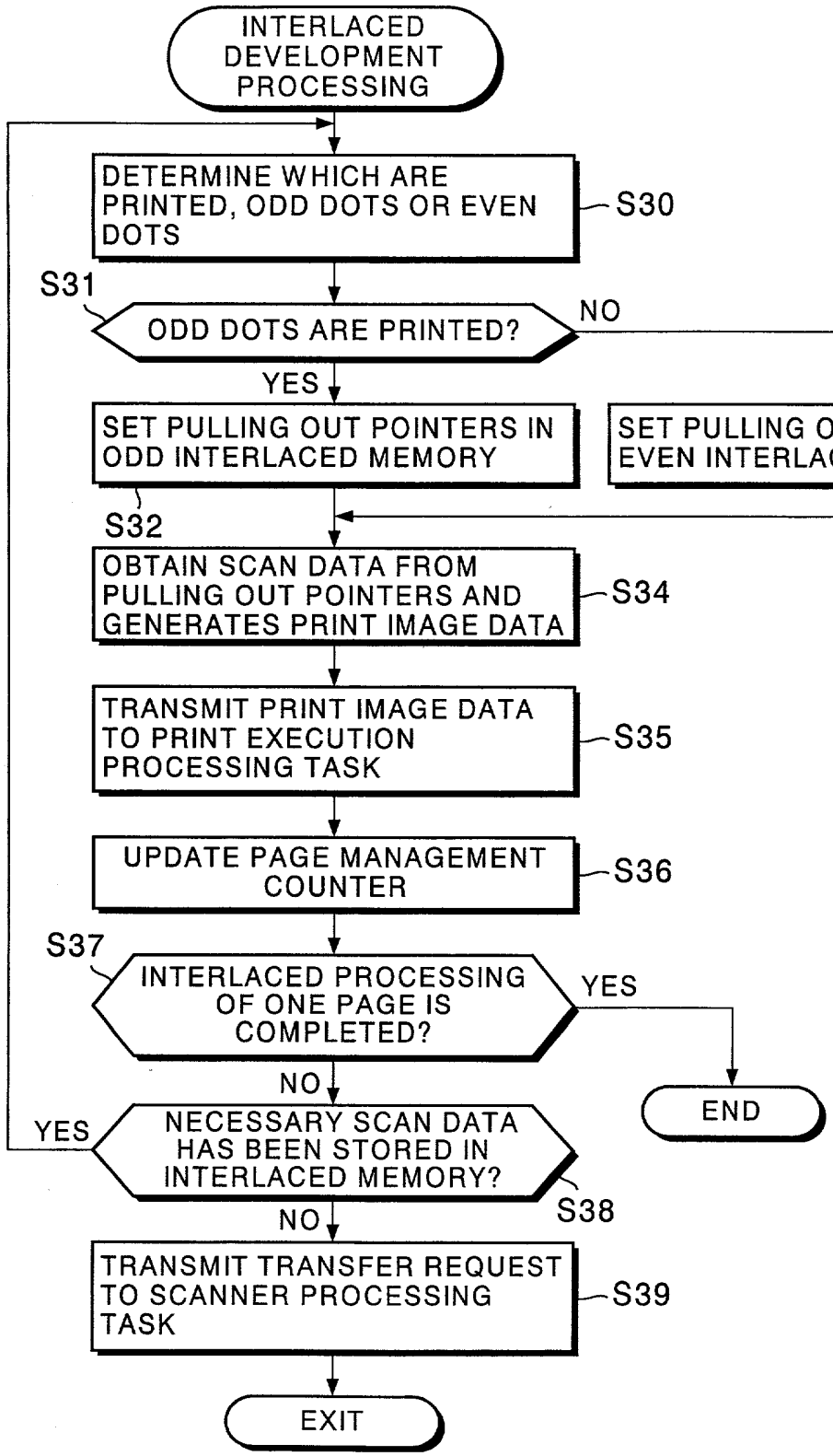
INTERLACED DEVELOPMENT PROCESSING
DETERMINE WHICH ARE PRINTED, ODD DOTS OR EVEN DOTS
S30
S31
ODD DOTS ARE PRINTED?
NO
YES
S33
SET PULLING OUT POINTERS IN ODD INTERLACED MEMORY
SET PULLING OUT POINTERS IN EVEN INTERLACED MEMORY
S32
OBTAIN SCAN DATA FROM PULLING OUT POINTERS AND GENERATES PRINT IMAGE DATA
S34
TRANSMIT PRINT IMAGE DATA TO PRINT EXECUTION PROCESSING TASK
S35
UPDATE PAGE MANAGEMENT COUNTER
S36
S37
INTERLACED PROCESSING OF ONE PAGE IS COMPLETED?
YES
NO
END
YES
NECESSARY SCAN DATA HAS BEEN STORED IN INTERLACED MEMORY?
S38
NO
TRANSMIT TRANSFER REQUEST TO SCANNER PROCESSING TASK
S39
EXIT

FIG. 6

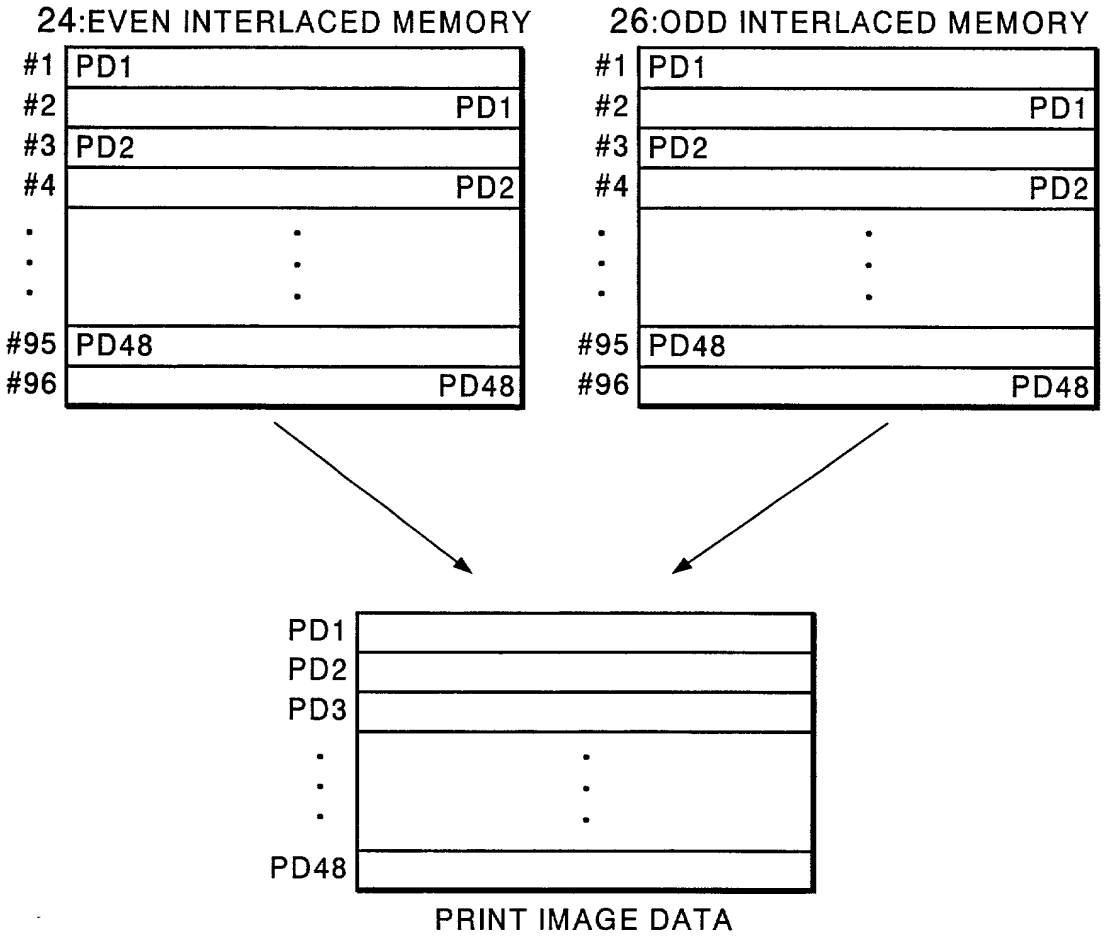
24:EVEN INTERLACED MEMORY
#1 PD1
#2 PD1
#3 PD2
#4 PD2
#95 PD48
#96 PD48
26:ODD INTERLACED MEMORY
#1 PD1
#2 PD1
#3 PD2
#4 PD2
#95 PD48
#96 PD48
PD1
PD2
PD3
PD48
PRINT IMAGE DATA

FIG. 7

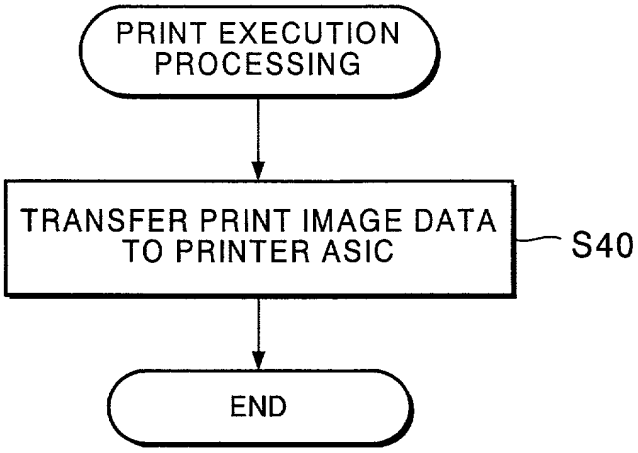
PRINT EXECUTION PROCESSING
TRANSFER PRINT IMAGE DATA TO PRINTER ASIC
S40
END

FIG. 8

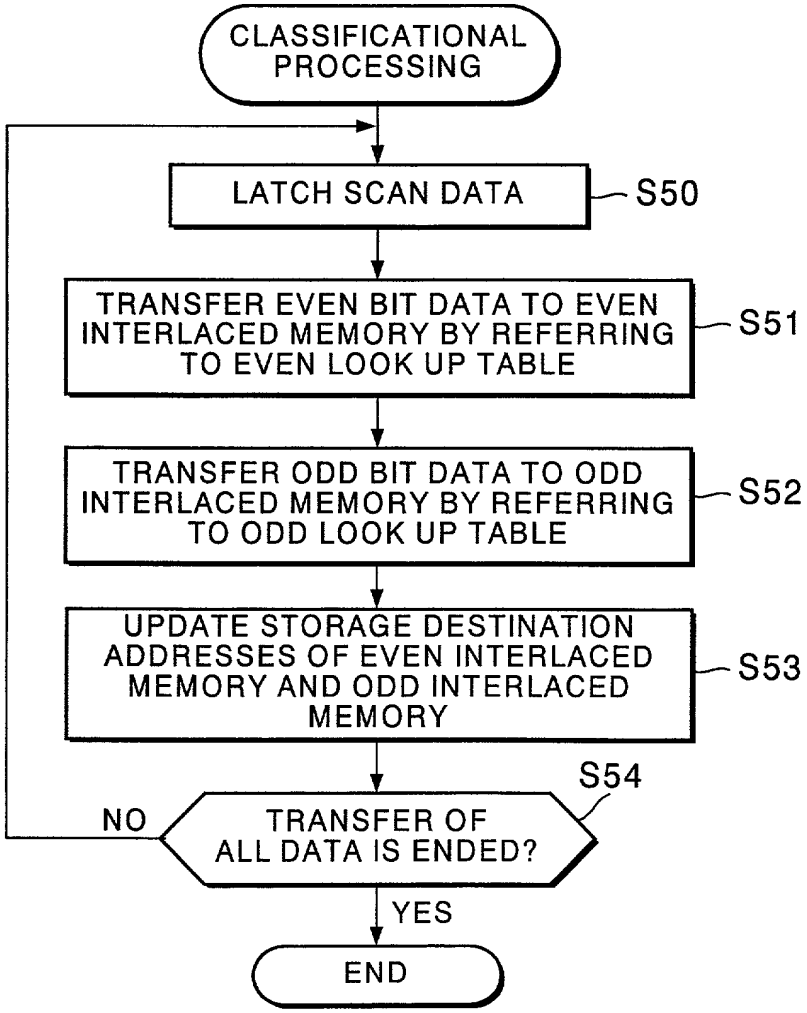
CLASSIFICATIONAL PROCESSING
LATCH SCAN DATA
S50
TRANSFER EVEN BIT DATA TO EVEN INTERLACED MEMORY BY REFERRING TO EVEN LOOK UP TABLE
S51
TRANSFER ODD BIT DATA TO ODD INTERLACED MEMORY BY REFERRING TO ODD LOOK UP TABLE
S52
UPDATE STORAGE DESTINATION ADDRESSES OF EVEN INTERLACED MEMORY AND ODD INTERLACED MEMORY
S53
S54
NO
TRANSFER OF ALL DATA IS ENDED?
YES
END

FIG. 9

TB0: EVEN LOOK UP TABLE

SCAN DATA	EVEN BIT DATA
0 0 0 0 0 0 0 0	0 0 0 0
0 0 0 0 0 0 0 1	0 0 0 1
0 0 0 0 0 0 1 0	0 0 0 0
. . .	. . .
0 0 1 1 0 1 0 0	0 1 1 0
0 0 1 1 0 1 0 1	0 1 1 1
0 0 1 1 0 1 1 0	0 1 1 0
. . .	. . .
1 1 1 1 1 1 0 1	1 1 1 1
1 1 1 1 1 1 1 0	1 1 1 0
1 1 1 1 1 1 1 1	1 1 1 1

FIG. 10

TB1: ODD LOOK UP TABLE

SCAN DATA	ODD BIT DATA
0 0 0 0 0 0 0 0	0 0 0 0
0 0 0 0 0 0 0 1	0 0 0 0
0 0 0 0 0 0 1 0	0 0 0 1
. . .	. . .
0 0 1 1 0 1 0 0	0 1 0 0
0 0 1 1 0 1 0 1	0 1 0 0
0 0 1 1 0 1 1 0	0 1 0 1
. . .	. . .
1 1 1 1 1 1 0 1	1 1 1 0
1 1 1 1 1 1 1 0	1 1 1 1
1 1 1 1 1 1 1 1	1 1 1 1

FIG. 11

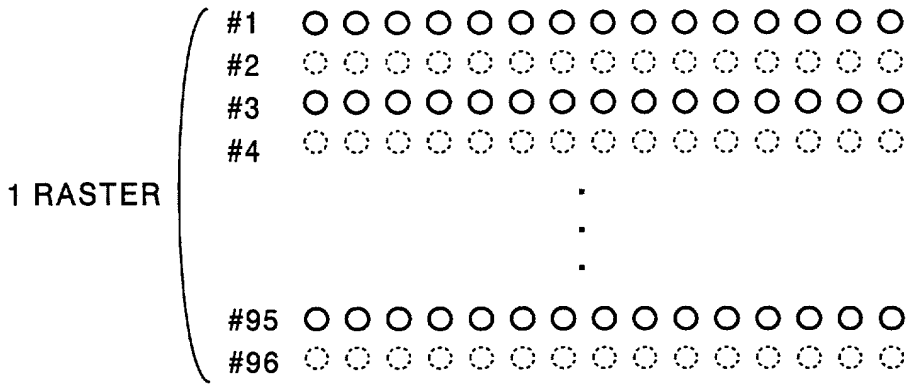

FIG. 12

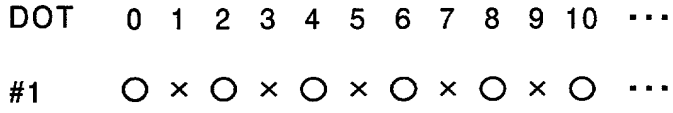

FIG. 13

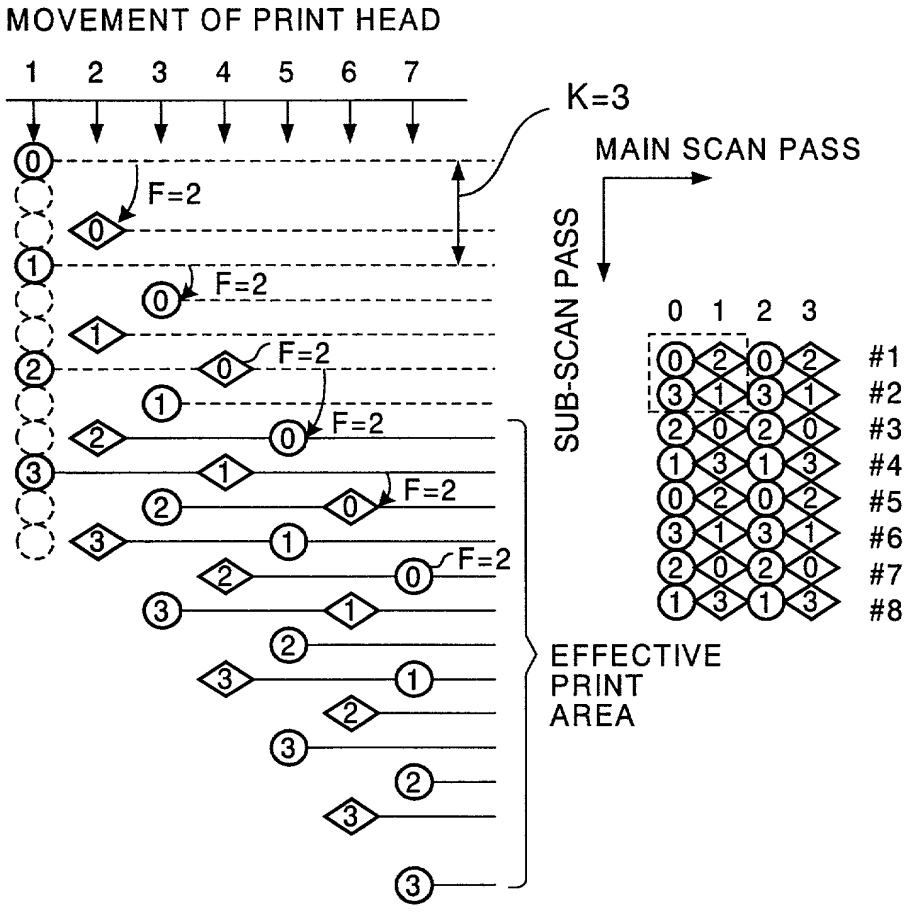
MOVEMENT OF PRINT HEAD
1 2 3 4 5 6 7
K=3
MAIN SCAN PASS
SUB-SCAN PASS
F=2
0 1 2 3
#1
#2
#3
#4
#5
#6
#7
#8
EFFECTIVE
PRINT
AREA

FIG. 14

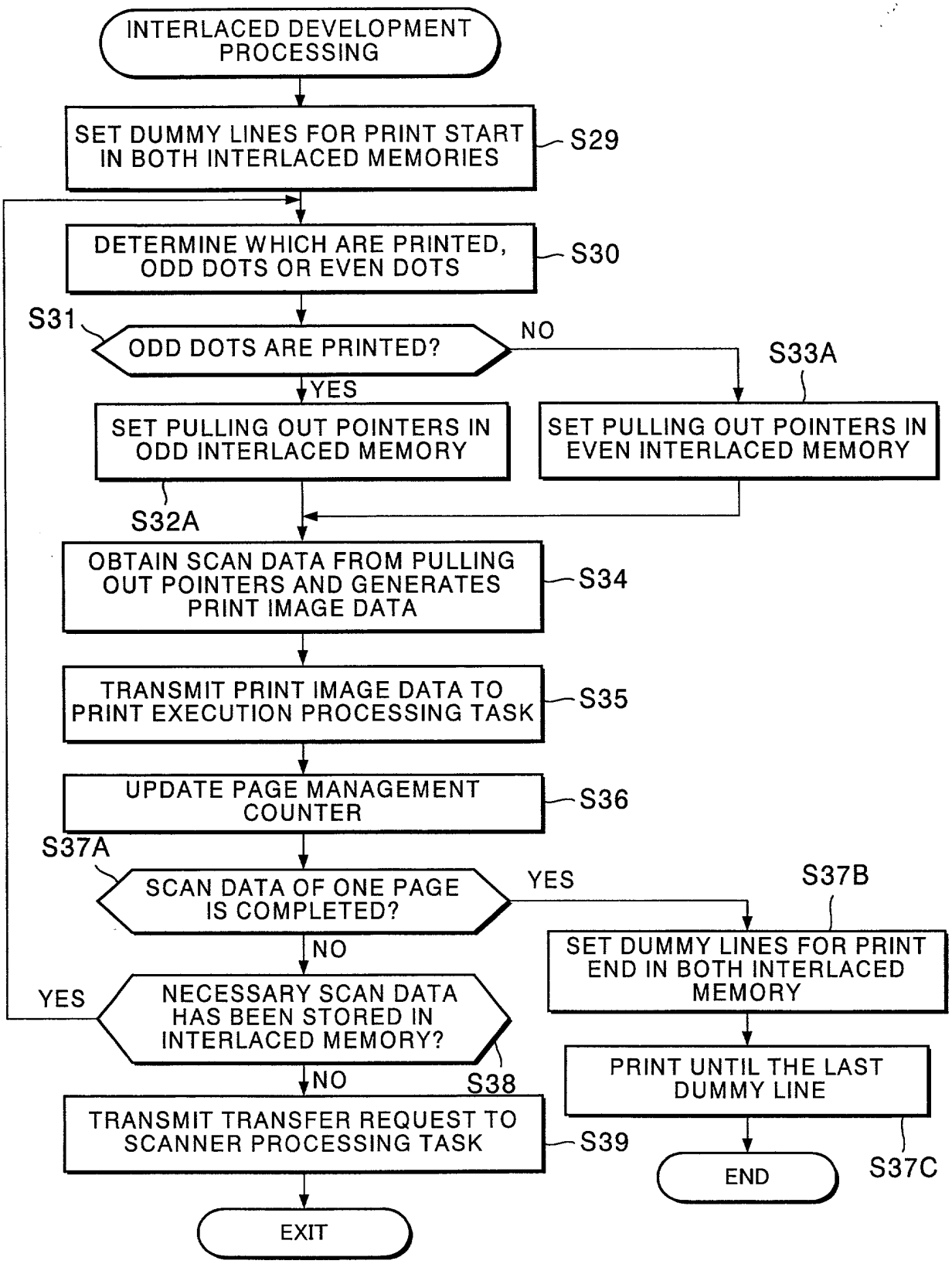
INTERLACED DEVELOPMENT PROCESSING
SET DUMMY LINES FOR PRINT START IN BOTH INTERLACED MEMORIES
S29
DETERMINE WHICH ARE PRINTED, ODD DOTS OR EVEN DOTS
S30
S31
ODD DOTS ARE PRINTED?
NO
S33A
YES
SET PULLING OUT POINTERS IN ODD INTERLACED MEMORY
SET PULLING OUT POINTERS IN EVEN INTERLACED MEMORY
S32A
OBTAIN SCAN DATA FROM PULLING OUT POINTERS AND GENERATES PRINT IMAGE DATA
S34
TRANSMIT PRINT IMAGE DATA TO PRINT EXECUTION PROCESSING TASK
S35
UPDATE PAGE MANAGEMENT COUNTER
S36
S37A
SCAN DATA OF ONE PAGE IS COMPLETED?
YES
S37B
NO
SET DUMMY LINES FOR PRINT END IN BOTH INTERLACED MEMORY
YES
NECESSARY SCAN DATA HAS BEEN STORED IN INTERLACED MEMORY?
PRINT UNTIL THE LAST DUMMY LINE
NO
S38
TRANSMIT TRANSFER REQUEST TO SCANNER PROCESSING TASK
S39
END
S37C
EXIT

FIG. 15

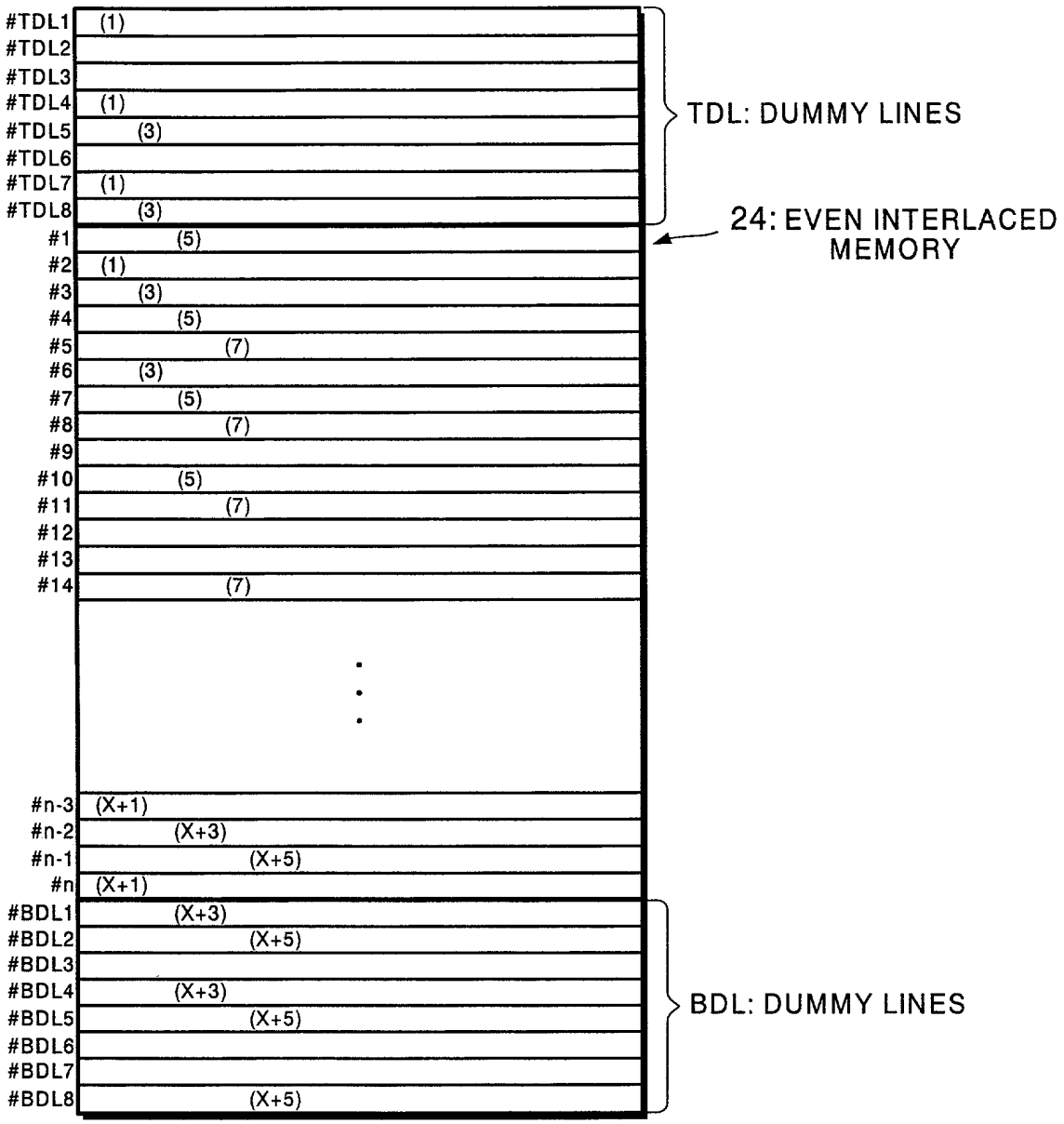
#TDL1
#TDL2
#TDL3
#TDL4
#TDL5
#TDL6
#TDL7
#TDL8
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
#n-3
#n-2
#n-1
#n
#BDL1
#BDL2
#BDL3
#BDL4
#BDL5
#BDL6
#BDL7
#BDL8
(1)
(3)
(5)
(7)
(X+1)
(X+3)
(X+5)
TDL: DUMMY LINES
24: EVEN INTERLACED MEMORY
BDL: DUMMY LINES

FIG. 16

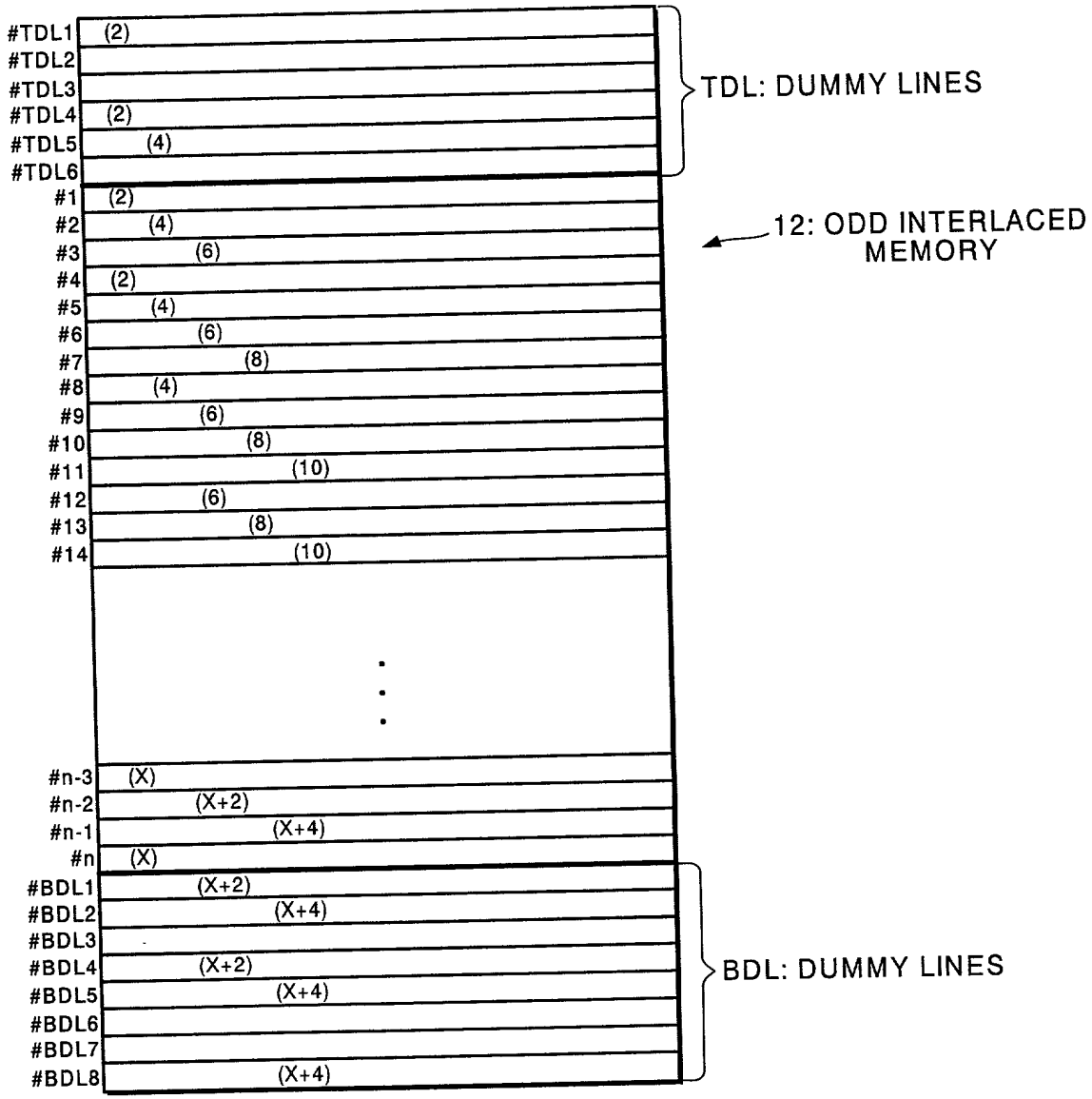
#TDL1
#TDL2
#TDL3
#TDL4
#TDL5
#TDL6
(2)
(2)
(4)
TDL: DUMMY LINES
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
(2)
(4)
(6)
(2)
(4)
(6)
(8)
(4)
(6)
(8)
(10)
(6)
(8)
(10)
12: ODD INTERLACED MEMORY
#n-3
#n-2
#n-1
#n
(X)
(X+2)
(X+4)
(X)
#BDL1
#BDL2
#BDL3
#BDL4
#BDL5
#BDL6
#BDL7
#BDL8
(X+2)
(X+4)
(X+2)
(X+4)
(X+4)
BDL: DUMMY LINES

FIG. 17

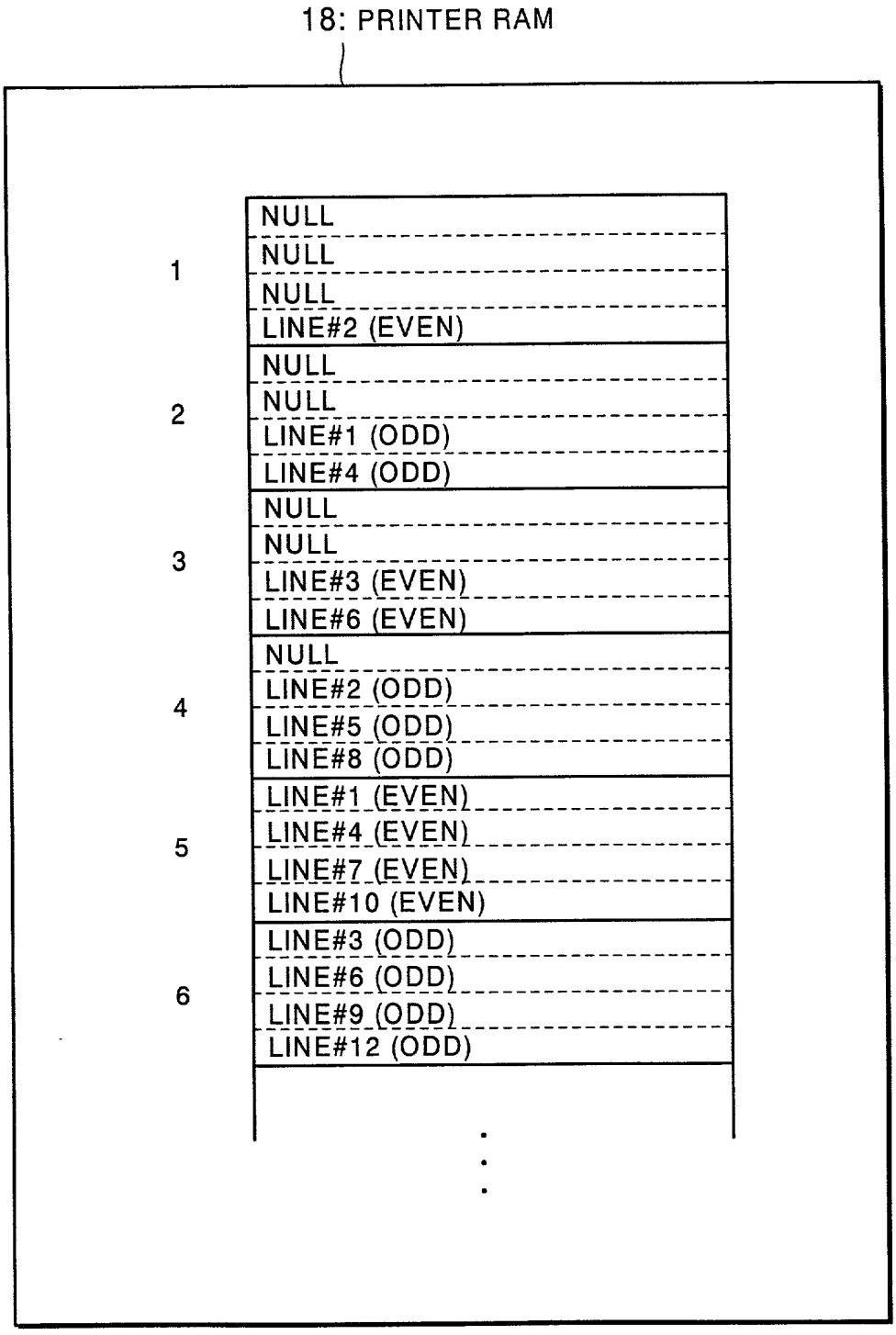
18: PRINTER RAM
1
NULL
NULL
NULL
LINE#2 (EVEN)
2
NULL
NULL
LINE#1 (ODD)
LINE#4 (ODD)
3
NULL
NULL
LINE#3 (EVEN)
LINE#6 (EVEN)
4
NULL
LINE#2 (ODD)
LINE#5 (ODD)
LINE#8 (ODD)
5
LINE#1 (EVEN)
LINE#4 (EVEN)
LINE#7 (EVEN)
LINE#10 (EVEN)
6
LINE#3 (ODD)
LINE#6 (ODD)
LINE#9 (ODD)
LINE#12 (ODD)

FIG. 18